Loc	First Name	Last Name	Institution	Title	Abstract	Collaborators
1	Andreas	Athenodorou	DESY Zeuthen	Closed 2+1 dimensional SU(N) flux-tubes as bosonic strings	We investigate the spectrum of confining flux-tubes that wind around a spatial torus of variable length l in D=2+1. The energies of the lowest ~30 states are compared to the free string Nambu-Goto model in flat space-time and in addition to recent results on the universal properties of effective string actions. We focus on our calculations in SU(6) at a very small lattice spacing; this is checked to be very close to the large-N continuum limit. Astonishingly, the spectrum of the closed flux-tube can be very well approximated by Nambu-Goto even at short lengths which are comparable to its width and even well below the critical length at which the expansion of the Nambu-Goto energy in powers of 1/l^2 diverges. In contrast to our recent results in D=3+1, we do not find any evidence for the presence of any non-string-like states associated to excitations of massive flux-tube modes.	Andreas Athenodorou, Michael Teper
2	Pedro	Bicudo	IST, Lisboa	String tension at finite temperature Lattice QCD	The critical curve of string tension as a function of the temperature is computed in SU(3) Lattice QCD. We present the results for the string tension utilizing a pair of Polyakov loop and antiloop, with two different techniques. We compare the colour averaged loop-antiloop which is gauge invariant but is only adequate to study the string tension, and the colour singlet loop-antiloop using the Landau gauge fixing which also enables to compute the coulomb part of the free energy .	Nuno Cardoso, Orlando Oliveira, Pedro Bicudo
3	Michele	Brambilla	ECT*	Efficiency on multi-core CPUs: the Wilson Dirac operator on Aurora	The Aurora machine is based on Intel Westmere processors, interconnected by a high speed (FPGA-based) torus network. An optimized code has to be tuned to the CPU architecture. A current trend in modern CPUs is the increasing number of cores per socket, with different levels of cache. These can be either shared between cores or reserved to a single one. We present different strategies for the implementation of the Wilson Dirac operator which aim at maximizing the performance on the Aurora architecture.	M. Brambilla, F. Di Renzo and M. Grossi
4	John	Bulava	DESY Zeuthen	Upper and lower Higgs mass bounds in the presence of a 4th generation	We present ongoing results from a chirally-invariant Higgs-Yukawa model. Specifically, we examine the effect of a potential heavy fourth generation of quarks on the upper and lower Higgs boson mass bounds.	John Bulava, Karl Jansen, Jim Kallarackal, Atilla Nagy
5	Bipasha	Chakraborty	U of Kentucky	Quark orbital angular momentum from lattice QCD	We calculate the quark orbital angular momentum of the nucleon from the quark energy-momentum tensor form factors on the lattice. The calculation is done on a quenched 16^3 \times 24 lattice at \beta=6.0 and with Wilson fermions at \kappa= 0.154, 0.155, 0.1555. We calculate the disconnected insertion stochastically which employs the Z_2 noise with an unbiased subtraction. This proves to be an efficient method to reduce the error from the noise.	Bipasha Chakraborty, Devdatta Mankame, Mridupawan Deka, Takumi Doi, Terrence Draper, Keh-Fei Liu
6	Gennaro	Cortese	CSIC U of Zaragoza & U della Calabria	Critical properties of 2D Z(N) vector models for N>4	We investigate the critical properties of two-dimensional Z(N) vector models for N larger than 4. We locate critical points and determine a few critical indices. We study also the behaviour with N of the helicity modulus.	O. Borisenko, G. Cortese, R. Fiore, M. Gravina, A. Papa

7	Alan	denBleyker	U of Iowa	Fisher's zeros, complex RG flows and confinement in LGT models.	The zeros of the partition function in the complex beta plane (Fisher's zeros) play an important role in our understanding of phase transitions and RG flows. Recently, it has been argued that they act as gates or separatrices for complex RG flows. Using reweighting and contructions of the density of states, we calculate the Fisher's zeros for pure gauge SU(2) and U(1) on L^4 lattices. For SU(2), these zeros appear to move almost horizontally when the volume increases. They stay away from the real axis which indicates a confining theory at zero temperature. We discuss the effect of an adjoint term on these results. In contrast, using recent multicanonical simulations for the U(1) model for L up to 8 we find that the imaginary part of the zeros scales as L^{-3.07} and pinches the real axis at beta near 1.0113. Preliminary results concerning higher volumes will be presented. We will also discuss recent results for SU (3) with various numbers of flavors.	A. Bazavov, A. Denbleyker, Daping Du, Yuzhi Liu, Y. Meurice, B. Oktay and D. Sinclair
8	Massimo	DiPierro	DePaul U	A new user interface for the Gauge Connection lattice data archive U	The user interface to the gauge connection is being completely redesigned using web2py and grid tools, giving more functionality for the user.	J. Hetrick, David Skinner, and Shreyas Cholia
9	Shao-Jing	Dong	U of Kentucky	Flavor-singlet Z_A from Overlap Fermions on 2+1 flavor DWF configurations	The flavor-singlet axial renormalization constant Z_A is calculated via the anomalous Ward identity. Overlap fermion is used as the valence and topological charge operator is defined from the Overlap Dirac operator D^{ov}. The numerical calculation is done with the 2+1 flavor DWF configurations on 24^3 x 64 lattice.	S.J. Dong, A. Li, Ming Gong, K.F.Liu
10	Eigo	Shintani	RIKEN-BNL	Proton decay matrix elements in 2+1 domain-wall fermion	We present the first result of proton decay matrix elements in 2+1 flavor domain-wall fermion. We show the numerical results of form factor obtained from three-point function (i.e. without reducing the final state pi/K meson) with baryon number asymmetric 6-dimensional operator and twelve independent matrix elements of proton to meson decay in the physical kinematics. We also compare with the results from soft-pion theorem and quenched approximation.	Y. Aoki, T. Izubuchi, E. Shintani, A. Soni (RBC collaboration)
11	Pietro	Giudice	Swansea U	Lattice Planar QED in external magnetic field	We investigate planar Quantum ElectroDynamics (QED) with two degenerate staggered fermions in an external magnetic field on the lattice. Our preliminary results indicate that in external magnetic fields there is dynamical generation of mass for two-dimensional massless Dirac fermions in the weak coupling region. We comment on possible implications to the quantum Hall effect in graphene.	Paolo Cea, Leonardo Cosmai, Pietro Giudice, Alessandro Papa
12	Leonardo	Giusti	U of Milano-Bicocca	Glueball masses from ratios of path integrals	By generalizing our previous work on the parity symmetry, the partition function of a Yang--Mills theory is decomposed into a sum of path integrals each giving the contribution from multiplets of states with fixed quantum numbers associated to parity, charge conjugation, translations, rotations and central conjugations Z_N^3. Ratios of path integrals and correlation functions can then be computed with a multi-level Monte Carlo integration scheme whose numerical cost, at a fixed statistical precision and at asymptotically large times, increases power-like with the time extent of the lattice. The strategy is implemented for the SU(3) Yang--Mills theory, and a full-fledged computation of the mass and multiplicity of the lightest glueball with vacuum quantum numbers is carried out at two values of the lattice spacing (0.17 and 0.12 fm).	Michele Della Morte, Leonardo Giusti

13	Yong-Chull	Jang	Seoul National U	Multi GPU Performance of Conjugate Gradient Solver with Staggered Fermions in Mixed Precision	GPU has a significantly higher performance in single-precision computing than that of double precision. Hence, it is important to take a maximal advantage of the single precision in the CG inverter as suggested by the mixed precision algorithm. We have implemented mixed precision algorithm to our multi GPU conjugate gradient solver. By the single precision calculation, the bandwidth bottleneck is relieved and overall performance is doubled. We use MILC fine lattices (28^3\times 96, 40^3\times 96) to test the performance of nvidia GTX480 GPU.	Yong-Chull Jang, Hyung-Jin Kim, Weonjong Lee
14	Frithjof	Karsch	Brookhaven National Laboratory	Universal behavior in 3d O(4) models: The scaling function of the free energy and its derivatives	In contrast to the well established scaling function f_G(z) and f_\chi (z), which control the universal behavior of the order parameter and its susceptibility, we calculate the singular part of the free energy of the 3d O(4) spin model in terms of the scaling variable z ~ (T-Tc)/ (Tc H^{1/\beta\delta}). The main motivation for this calculation was to get access to derivatives of the scaling function for the free energy, which play a central role in the discussion of universal properties of moments of baryon number fluctuations in QCD.	Frithjof Karsch and Juergen Engels
15	Tony	Kennedy	U of Edinburgh	Partial spectrum of large hermitean matrices	We present a new variant of a Krylov space algorithm for finding the eigenpairs of a large hermitean matrix where the eigenvalues lie in a specified low density part of the spectrum. The method uses selective re-orthogonalization and re-starting to find each eigenpair once. We present theoretical bounds on the convergence rate, and show that these work well in practice for the hermitean Wilson Dirac operator. We have implemented the method in Chroma, and we show that it is significantly faster than the Ritz currently available.	A D Kennedy and Chris Johnson
16	Mario	Kieburg	State U of New York at Stony Brook	Random Matrix Models for Dirac Operators at finite Lattice Spacing	Chiral random matrix theory is a powerful mathematical tool to calculate eigenvalue correlations in the infrared limit of quantum chromodynamics (QCD). Since the 90's it has been successfully applied to the continuum limit of QCD. In this poster we use these methods to study discretization effects for Wilson fermions and staggered fermions. First we discuss a random matrix model for the Wilson-Dirac operator with fermions in the fundamental representation for more than two colors. We have obtained an analytical result for the joint probability density function of this matrix model in terms of a determinantal expression over complex pairs of eigenvalues, and real eigenvalues with positive or negative chirality. The explicit dependence on the lattice spacing can be readily read off from our results which are compared to numerical simulations of the random matrix theory. For the staggered Dirac operator we have studied random matrices modeling the transition to degenerate eigenvalues in the continuum limit. For cases with anti-unitary symmetries the model describes the transition between different anti-unitary symmetries in the approach to this limit.	Mario Kieburg, Jacobus Verbaarschot, and Savvas Zafeiropoulos
17	Andreas	Kronfeld	Fermilab	The 't Hooft vertex for staggered fermions and flavor-singlet mesons	We derive the 't Hooft vertex for staggered fermions and examine its symmetries. We also derive a set of structural properties for the eigenvectors of the staggered Dirac operator, which should emerge in the continuum limit, if staggered fermions yield four species. We show numerically that the needed structure arises. This structure and symmetry of (unrooted) staggered fermions also imply that objections to the rooted determinant based on the ’t Hooft vertex are without foundation.	Gordon Donald, Christine Davies, Eduardo Follana, Andreas Kronfeld
						Kwangwoo Kim

18	Kim	Kwangwoo	Seoul National U	SU(3) Analysis of B_K with improved staggered quarks	We present a recent progress in data analysis of B_K calculated using improved staggered quarks. The fitting functional form is based on the SU(3) staggered chiral perturbation theory at the next to leading order. The results are compared with those of SU(2) analysis to check the self-consistency.	Kwangwoo Kim, Hyung-jin Kim, Boram Yoon, Jangho Kim, Yongchull Jang, Sunghee Kim, Weonjong Lee, Chulwoo Jung, Steve Sharpe
19	Bjorn	Leder	Wuppertal U	The static potential with dynamical fermions from Wilson loops	We present the analysis of the static potential extracted from Wilson loops measured on CLS ensembles generated with Wilson gauge action and Nf=2 flavors of O(a) improved Wilson quarks at three different lattice spacings and a range of quark masses. The shape of the static potential at distances well below the string breaking region is studied in terms of renormalized couplings derived from the static force and its derivative. We comment on the (im)possibility of extracting the Lambda parameter at our smallest lattice spacing a=0. 05 fm. Finally we give an update on the scale determination through r0.	Francesco Knechtli, Bjorn Leder
20	Frank	Lee	George Washington U	Spin Polarizabilties on the Lattice	Spin polarizabilities provide information on the internal struture of hadrons in the presence of weak electromagnetic fields, and are actively studied by Compton scattering experiments. They provide finer detail than the regular polarizabilties since they are induced by space and time-varying fields. We present a feasibility study of extracting spin polarizabilities using the background field method and lattice techniques.	Frank X. Lee, Andrei Alexdandru
21	Weonjong	Lee	Seoul National U	Discritization error and fitting in B_K	We have accumulated 9 times more statistics on the MILC fine ensembles to calculate B_K. As a result the data point is shifted by about one sigma. However, it is enough to spoil the linear fitting in a^2. Hence, we need a new fitting functional form and fitting strategy. We discuss about this inconvenient truth.	Weonjong Lee, SWME Collaboration
22	Kohtaroh	Miura	LNF-INFN	QCD Phase Diagram in Strong Coupling Lattice QCD with Polyakov Loops	In FAIR experiments and beam energy scan program at RHIC, it is the goal to search for the position of the critical point and first-order phase boundary in the QCD phase diagram. Strong Coupling Lattice QCD has been applied to investigate the QCD phase diagram at finite temperature (T) and chemical potential. We take account of both the chiral and Z3-deconfinement dynamics in the strong coupling lattice QCD. We report following results: 1. The critical temperature at zero chemical potential is consistent with those of Monte Carlo simulations in the strong coupling region. 2. In the finite chemical potential region, the critical point temperature reduces and the first order chiral phase transition line shrinks due to the Polyakov loop effects. 3. The Polyakov loop increasing rate (dl/dT) as well as the Polyakov loop susceptibility show double-peak structure as a function of T, a chiral-induced and Z_3-induced peaks in the wide-range of beta=2Nc/g^2. These results would give a useful milestone to Monomer-Dimer-Polymer simulations.	Kohtaroh Miura, Akira Ohnishi, Takashi Z. Nakano, and Noboru Kawamoto

23	Keiko	Murano	RIKEN, Nishina Center	Nuclear forces in the odd parity sector and the LS forces	It was recently pointed out that baryon-baryon potentials can be constructed in lattice QCD from Nambu-Bethe-Salpeter (NBS) wave functions through Schrodinger's equation. In this method cental and tensor potentials appear at the leading order of the derivative expansion, while the LS potential is at next to leading order. Whereas these three potentials play important roles in nuclear physics, only the central and tensor potentials in the even parity sector have been calculated so far. Remaining terms such as the central and tensor potentials in the odd parity sector as well as the LS potential must be determined, in order to employ these potentils in nuclear physics. As a first step toward this direction, we calculate NBS wave functions in the odd parity sector including ones with higher partial waves in Lattice QCD.	K. Murano for HAL QCD Collaboration
24	Ethan	Neil	Fermilab	B and D meson decay constants from 2+1 flavor improved staggered simulations	We give a preliminary report on new results for the decay constants f_B, f_Bs, f_D, and f_Ds, based on extended runs with higher statistics. These quantities are important tests of the standard model, in particular entering as inputs to the CKM unitarity triangle. This study makes use of MILC (2+1)-flavor asqtad ensembles, with heavy quarks incorporated using the clover action with the Fermilab method. Ensembles used vary in lattice spacing from a = 0.06 to 0.15 fm, with light sea quark masses down to 1/20 of the strange quark mass. Partially quenched, staggered chiral perturbation theory is used to extract the decay constants at the physical point. Final results from an older version of the calculation are also presented.	Ethan T. Neil, Jon A. Bailey, A. Bazavov, C. Bernard, C. Bouchard, C. DeTar, M. Di Pierro, A.X. El-Khadra, R.T. Evans, E. Freeland, E. Gamiz, Steven Gottlieb, U.M. Heller, J. E. Hetrick, R. Jain, A.S. Kronfeld, J. Laiho, L. Levkova, P.B. Mackenzie, M. B. Oktay, J. N. Simone, R. Sugar, D. Toussaint, and R.S. Van de Water
25	James	Osborne	San Francisco State U	On the Extraction of the Strong Coupling Constant from Hadronic Tau Decay	The extraction of the strong coupling constant from hadronic tau decay provides its most precise experimental determination, resulting in uncertainties competitive with determinations on the lattice. We examine the effect of duality violations in the analysis of this data, and propose a more comprehensive method of analysis which accounts for such systematic uncertainties. We conclude that the presence of duality violations contributes a non-negligible systematic uncertainty to the analysis of tau decay data. Our analysis provides a new estimate of the uncertainties, replacing previous incomplete estimates.	D. Boito, O. Cata, M. Golterman, M. Jamin, K. Maltman, J. Osborne, S. Peris
26	Alessandro	Papa	Universita` della Calabria and INFN-Cosenza	Flux tubes in the SU(3) vacuum	We analyze the distribution of the chromoelectric field generated by a static quark-antiquark pair in the SU(3) vacuum. We find that the transverse profile of the flux tube resembles the dual version of the Abrikosov vortex field distribution and give an estimate of the London penetration length in the confined vacuum.	M.S. Cardaci, P. Cea, L. Cosmai, R. Falcone, A. Papa
27	Gregory	Petropoulos	U of Colorado	MCRG study of the SU(2) pure gauge model with mixed fundamental-adjoint action	We investigate the bare step scaling function of the pure gauge SU (2) model with mixed fundamental-adjoint plaquette action, using MCRG techniques. The goal of this study is to reveal how MCRG behaves near the first order phase transition line and along its extension toward the fundamental axis and negative adjoint couplings. Our results indicate that the renormalization group flow is not governed any longer by the perturbative fixed point at couplings near or beyond the first order line or its immediate extension. RG matching is no longer feasible in this region.	Anna Hasenfratz, Gregory Petropoulos, Oscar Henriksson

28	Andrew	Pochinsky	MIT	Lattice QCD with Qlua	We present a Qlua programming language for Lattice QCD. Qlua interfaces the data parallel paradigm with the Lua programming language. It provides a natural framework for integrating highly optimized routines with USQCD libraries into an application. Resulting Qlua scripts are fully portable across architectures. The system has been ported to most of available LQCD platforms. Qlua is available under an open source license.	Andrew V. Pochinsky, Sergey N. Syrithsyn
29	Takuya	Saito	Kochi U	The center magnetic vortex and its influence on physical quantities in the gluon plasma	We show the evidence that magnetic degrees of freedom are so singular even in the deconfinement phase via a numerical lattice simulation of center magnetic vortex.The magnetic vortices in thermal medium affect gluon propagators, transport coefficients and equation of state of plasma.	T. Saito, Y. Nakagawa and A. Nakamura
30	Dmitry	Shcherbakov	U Wuppertal	Geometric Numerical Integration Structure-Preserving Algorithms for QCD Simulations	It is well known that molecular dynamics integrators, which can be applied for QCD simulations, often suffer from instabilities. Besides, such issues can arise already in rather simple model systems. Hence, it is a crucial task to avoid these instabilities and we propose to consider state-of-the-art geometric integrators to resolve this problem. Hereby, our goal is to construct a multistep method which preserves both symplectic and symmetry properties of the numerical solution for QCD equations without any losses in accuracy or additional computational efforts. In order to get a first illustrative insight, we apply the integration schemes to the model system of the simple harmonic oscillator and demonstrate the conservation of the geometric properties for the solution of this system. Based on this preliminary investigations, we will decide upon our next steps towards a proper application of these newly obtained methods for more complicated systems, like lattice QCD simulations. References: 1. E. Hairer, C. Lubich, G. Wanner ,"Geometric Numerical Integration Structure-Preserving Algorithms for Ordinary Differential Equations", Springer Series in Computational Mathematics Vol. 31, 2nd Edition, Springer Heidelberg, 2006. 2. B. Joo ,"Reversibility and Instabilities in Hybrid Monte Carlo Simulations", in: "QCD and Numerical Analysis", Springer Heidelberg, 2005, pp. 91-99.	Dmitry Shcherbakov
31	Zhifeng	Shi	The College of William and Mary	Investigations of QCD at non-zero isospin density	We investigate QCD at large isospin density induced by explicit construction of many pion systems via multi-source recursion relations. At large isospin density, corresponding to an isospin chemical potential \mu_I \sim m_{\rho}, we find indications of a phase transition to a conjectured \rho-condensed phase. Further investigations are performed by directly studying rho meson propagation in a pionic medium.	Zhifeng Shi, William Detmold
32	Tiago	Nunes da Silva	U of Groningen	The strong coupling bulk transition of twelve flavors	We give an update on the status of our study of the phase diagram of SU(3) Yang-Mills theory with twelve flavors of staggered fermions in the fundamental representation. More specifically, we explore the nature of the bulk (zero temperature) transition at strong coupling. The latter has been found in Deuzeman, Lombardo, Pallante "Evidence for a Conformal Phase in SU(3) gauge theories", PRD 82 (2010) 074503, to separate a weak coupling chirally symmetric phase from a strongly coupled chirally broken phase, in accordance with the Appelquist-Miransky-Yamawaki scenario for a conformal window.	Albert Deuzeman, Elisabetta Pallante, Maria Paola Lombardo and Tiago Nunes da Silva

33	Amarjit	Soni	BNL	Challenges of hadronic weak decays of B-mesons on the lattice	Lattice computation for hadronic weak decays is very challenging. Here we revisit the B -> D P (where P is a pion or kaon) amplitudes. In this we have a situation where there is potentially interesting and important phenomenology and no mixing of lower dimensional operators and consequently also no eye contractions. Furthermore, of most interest for applications to extract the unitarity angle gamma is the ratio: (B->D^0P)/(B-> \bar D^0 P) wherein many systematics will cancel. Taking cue from previous work with kaonic processes such as K to 2pi and as well as semileptonic B and K decays where the final mesons may have a large momentum, we investigate the possible use of such \Hard Pion Heavy-Light ChPT\" to B -> D P. Also direct lattice simulations may have a possible role to the extent that the presence of nearby resonances may be identifiable by studying the time dependence of the relevant correlators"	Christopher Aubin, C.-J. David Lin and Amarjit Soni
34	Yusuke	Taniguchi	U of Tsukuba	Renormalization factor of four fermi operators with clover fermion and Iwasaki gauge action	We shall present renormalization factors of the four fermi operators at one loop level for the clover fermion and Iwasaki gauge action. We consider the (Delta S)=1 operators and shall simplify the mixing structure by adopting the parity odd part. We shall present both contributions from the penguin diagram and the ordinary four fermi diagram.	N. Ishizuka, Y. Taniguchi, A. Ukawa and T. Yoshie for PACS-CS Collaboration
35	Chik Him	Wong	Carnegie Mellon U	Excited states and Multi-Hadron Scattering using the stochastic LapH method	The stochastic LapH method is used to study multi-hadron scattering, in particular the two-pion I=0,1,2 scattering and rho meson decay. Quantities of interest such as scattering lengths and phase shifts are extracted from correlator matrices which include disconnected and box diagram contributions. Extraction of excited-state masses is also presented.	Colin Morningstar, John Bulava, Justin Foley, You-Cyuan Jhang, Keisuke Juge, David Lenkner, Chik Him Wong
36	Norikazu	Yamada	KEK	Exploring infrared fixed point in SU(N) gauge theories	This talk consists two parts. One is an update of the running coupling constant and the preliminary result of mass anomalous dimension in ten-flavor QCD theory. The other is spectroscopy in many-flavor two-color QCD, focusing on the phase structure of the Wilson fermion. Both studies are devoted to exploration of infrared fixed point and hence to the construction of realistic technicolor models.	N. Yamada, M. Hayakawa, K.-I. Ishikawa, Y. Osaki, S. Takeda, S. Uno
37	Raj	Kettimuthu	GLOBUS Online (SPONSOR)	Accelerating Data Movement to Support Lattice QCD Computations		